

# Estrous Cycle in Rodents: Phases, Characteristics and Neuroendocrine regulation



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## Abstract:

Estrous cycle is the sequence of events of reproductive cycle in mammals other than primates. The estrous cycle in mice lasts for 4-5 days and is classified as proestrus, estrus, metestrus, and diestrus. Microscopic evaluation of the type of cells present in vaginal smears is the most accepted way of assessment of estrous cycle. The duration and proportion of these cell types vary among species. Cyclic ovarian function is under the control of hypothalamic-pituitary-gonadal (HPG) axis. The gonadotropes responding to gonadotropin-releasing hormone (GnRH), synthesize and release luteinizing hormone (LH) and follicle stimulating hormone (FSH), which induce ovarian folliculogenesis, ovulation and formation of corpus luteum (CL). Greatest GnRH release triggers the preovulatory surge of gonadotropins on the afternoon of proestrus, subsequently plasma estrogen level reaches a peak which stimulates a small surge in FSH followed by a marked surge of progesterone. Ovulation occurs during estrus, when female is highly receptive to male. Mammals were classified based on the ovulation patterns as coitus-induced ovulators and spontaneous ovulators. The rats and mice come under the category of spontaneous ovulators. Species whose estrous period is confined to a certain time of year are referred to as seasonal breeders. The present review is an attempt to provide a comparative account of phases of estrous cyclicity among laboratory mammals, viz. mice, rats and hamsters and the neuroendocrine regulation of estrous cycle. The present review provides the details of various methodologies and formulations utilized in earlier studies to calculate the estrous cyclicity among multiple groups.

**Key words:** Estrous cycle; mouse; rat; hamster

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## 1. Introduction:

Estrous and menstrual cycles are the reproductive cycles occur in mammals and are the phenomenon of cyclic ovarian function. These reproductive cycles are required to produce mature ova through ovulation, which is essential for fertilization in the oviduct. Three interacting components viz., the hypothalamus, anterior pituitary and ovary control cyclic ovarian function. The hypothalamus has neurons that release neuropeptide GnRH into the hypophysial portal vasculature. This neuropeptide acts on the anterior pituitary to stimulate the release of the gonadotropins (LH and FSH). The gonadotropins acting on the ovary supply the signals that control the estrous cycle and stimulate the production of estradiol and progesterone. Estrous cycles are named for the cyclic appearance of behavioural sexual activity (estrus) that